Games of Chance! Entry Document Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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A games committee has developed a series of “games of chance” for the upcoming PTO carnival fundraiser. Your team has been selected to evaluate the games and rank them by their difficulty. The most difficult games are the ones a player is least likely to win will have the best prizes attached to the hardest-to-win games.

**For each game, the committee will need the following:**

1. **The Sample Space:** Each game has a certain number of possible outcomes. List each either in a table or a tree diagram.
2. **The experimental probability of each outcome:** Play the game for 20 rounds per team member and record each outcome. Make a chart showing how often each outcome occurred and report it in fraction, decimal, and percent form.
3. **The theoretical probability of each outcome in the sample space:** How likely each outcome is to occur divided by the total number of outcomes. Report these probabilities in fraction, decimal, and percent form.
4. **Game rankings:** Rank each game from easiest to most difficult based on how likely a player is to win the game.

**Notes:**

* Experimental probabilities may differ some, but theoretical probabilities will be definite. You will be graded for reasonableness with the EP and accuracy in the TP.
* Presentation matters! Develop a neat and clear way to express your findings. Teams that do a better job will receive higher marks.

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With my signature, I pledge to give my best effort for my own sake as well as the sake of my team. I will be focused and work well cooperatively to generate a product worthy of respect.

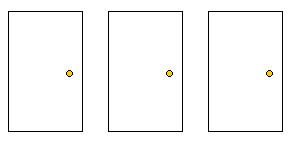
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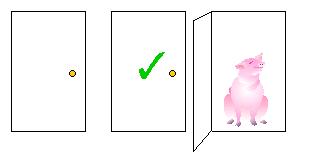
**Keep/Switch**

**The Game:** Choose the one red card among two black cards.

1. Three cards are placed on the table face down. The dealer knows the position of the red card ahead of time.
2. The player chooses one card, which stays face down.
3. The dealer then flips over one of the black cards and asks the player if he wishes to keep his original choice or switch to the other card.
4. Once the player’s choice is made, their card is flipped over (either the one they kept or the one they switched to).
5. If the player’s card is red, he wins. If black, he loses.

**Example:**

Three options are given.

Player chooses, dealer reveals a loser. Player can then keep their first choice or switch to the other choice.

**Instructions:**

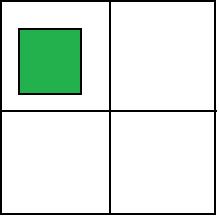
1. Take three cards and perform 20 trials on each team member. Track the total number of keeps and changes, and whether the decision led to a win or loss.
2. Determine the theoretical probability of winning and of losing.
3. Present your results in writing.

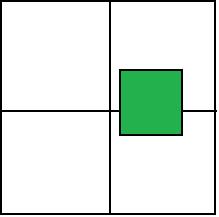
Research:<http://people.hofstra.edu/Steven_R_Costenoble/MontyHall/MontyHallSim.html>

**Grid-O-Rama!**

**The Game:** Toss a 6.5” bean bag onto a grid so that no part of it touches one of the grid lines. The gridlines are 12” apart.

**Example:**

 WIN!

LOSE ☹

**Instructions:**

1. Take the bean bags and perform 20 trials for each team member. Track the total number of wins and losses.
2. Determine the theoretical probability of winning and of losing. (Hint: each bean bag has a length and width of 6.5”, each tile has a length and width of 12”. The grid has a length and width of 60.4375”).
3. Present your results in writing.

Research: <http://mste.illinois.edu/reese/buffon/bufjava.html>

**Monticello!**

**The Game:** Two quarters and a nickel are placed in a cup. The cup is shaken and placed top down, hiding the coins. If the player correctly guesses the position of the quarters (two heads, two tails, heads and tails), the player wins. If the nickel is tails up (showing Monticello), then the player must flip one of the quarters into the air. If the final arrangement is what the player originally chose, she wins.

**Example:**

This arrangement stays. If the player correctly guessed “Heads Tails” for the quarters, she wins.

Even if this is what the player guessed, she must flip one of the quarters. If the result of the flip stays the same, she still wins.

**Instructions:**

1. Perform 20 trials for each team member. Track the total number of wins and losses.
2. Determine the theoretical probability of winning and of losing.
3. Present your results in writing.

**7-Eleven**

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**The Game:** The player rolls two dice. If she rolls a seven or an eleven, she wins.

**Instructions:**

1. Perform 20 trials for each team member. Track the total number of wins and losses.
2. Determine the theoretical probability of winning and of losing.
3. Present your results in writing.

**Research:** <http://www.edcollins.com/backgammon/diceprob.htm>

**The Clock of Fate**

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**The Game:** A player chooses any number on a clock face. The player then rolls two dice and moves clockwise as many places as he rolled. If his final position is on the “12”, he wins.

**Instructions:**

1. Perform 20 trials for each team member. Track the total number of wins and losses.
2. Determine the theoretical probability of winning and of losing.
3. Present your results in writing.

**Research:** <http://www.shodor.org/interactivate/discussions/ClocksAndModular/>

**Mini-Lotto**

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**The Game:** First, the player must correctly guess the outcome of the roll of a number cube. If successful, they must correctly guess the outcome of the roll of a ten-sided die. If they do both successfully in one attempt, they win.

**Instructions:**

1. Perform 20 trials for each team member. Track the total number of wins and losses.
2. Determine the theoretical probability of winning and of losing.
3. Present your results in writing.